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## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
 US Department of Commerce  
 United States Patent and Trademark  
 Office, PCT  
 2011 South Clark Place Room  
 CP2/5C24  
 Arlington, VA 22202  
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

<b>Date of mailing</b> (day/month/year) 16 November 2000 (16.11.00)	
<b>International application No.</b> PCT/EP00/04385	<b>Applicant's or agent's file reference</b> P/14/33.WO
<b>International filing date</b> (day/month/year) 26 April 2000 (26.04.00)	<b>Priority date</b> (day/month/year) 26 April 1999 (26.04.99)
<b>Applicant</b> HAYWARD, Philip, Fields	

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

02 October 2000 (02.10.00)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer S. Mafla Telephone No.: (41-22) 338.83.38
---	--

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>P/14/33.WO</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/EP 00/ 04385</b>	International filing date (day/month/year) <b>26/04/2000</b>	(Earliest) Priority Date (day/month/year) <b>26/04/1999</b>
Applicant  <b>HAYWARD, Phillip Fields</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

### 1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of Invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

2  
☐ None of the figures.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
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AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
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BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
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CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 F16J3/04

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F16J F16D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EP0-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 794 347 A (G.BOUQUEREL) 10 September 1997 (1997-09-10)  the whole document ---	1-7,9, 14,15, 18-20
X	WO 97 26473 A (HAYWARD PHILLIP FIELDS ;BIDLE SIMON (GB)) 24 July 1997 (1997-07-24) the whole document ---	1-7,9, 14,15
A	GB 2 281 301 A (NTN TOYO BEARING CO LTD) 1 March 1995 (1995-03-01) the whole document ---	10-13
A	US 3 795 118 A (ZITKO R ET AL) 5 March 1974 (1974-03-05) column 4, line 14 - line 55; figure 7 --- -/--	1,21

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

1 September 2000

Date of mailing of the international search report

08/09/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

Hoffmann, M

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 33 24 997 A (BOGE FERDINAND) 24 January 1985 (1985-01-24) claims 1-10; figure 1 -----	1

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 794347	A	10-09-1997	FR	2745867 A	12-09-1997
WO 9726473	A	24-07-1997	AU	1393297 A	11-08-1997
			CA	2242988 A	24-07-1997
			EP	0873484 A	28-10-1998
			GB	2323899 A,B	07-10-1998
			JP	2000503372 T	21-03-2000
GB 2281301	A	01-03-1995	DE	4330182 A	02-03-1995
			FR	2709531 A	10-03-1995
US 3795118	A	05-03-1974	CA	967383 A	13-05-1975
			DE	2330539 A	03-01-1974
			FR	2190211 A	25-01-1974
			GB	1423458 A	04-02-1976
			JP	49062839 A	18-06-1974
DE 3324997	A	24-01-1985	NONE		

PC

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

Filing Office use only

PCT/EP 00/04385

International Application No.

26 APR 2000

International Filing Date

(26.04.2000)

EUROPEAN PATENT OFFICE

PCT INTERNATIONAL APPLICATION

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum)

PCT/4733.WO

Box No. I TITLE OF INVENTION  
A METHOD OF INSTALLING A PROTECTIVE GAITER AROUND A JOINT

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

HAYWARD, PHILLIP FIELDS  
Unit 8, Chorley North Industrial Park,  
Chorley, Lancashire,  
PR6 7BX  
United Kingdom

☒ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:

United Kingdom

State (that is, country) of residence:

United Kingdom

This person is applicant  
for the purposes of:☒ all designated  
States☐ all designated States except  
the United States of America☐ the United States  
of America only☐ the States indicated in  
the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

☐ applicant only☐ applicant and inventor☐ inventor only (If this check-box  
is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant  
for the purposes of:☐ all designated  
States☐ all designated States except  
the United States of America☐ the United States  
of America only☐ the States indicated in  
the Supplemental Box☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf  
of the applicant(s) before the competent International Authorities as:

☒ agent☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

QUEST, Barry  
WILSON GUNN M'CAW,  
41-51 Royal Exchange, Cross Street,  
Manchester, M2 7BD  
United Kingdom

Telephone No.

0161 827 9400

Facsimile No.

0161 832 4905

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

32860



Box No. V	DESIGNATION	STATES	
The following designations are: <i>to be made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):</i>			
<b>Regional Patent</b>			
<input checked="" type="checkbox"/> AP	ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT		
<input checked="" type="checkbox"/> EA	Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT		
<input checked="" type="checkbox"/> EP	European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT		
<input checked="" type="checkbox"/> OA	OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)		
<b>National Patent (if other kind of protection or treatment desired, specify on dotted line):</b>			
<input checked="" type="checkbox"/> AE	United Arab Emirates	<input checked="" type="checkbox"/> LR	Liberia
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<input checked="" type="checkbox"/> AZ	Azerbaijan	<input checked="" type="checkbox"/> MA	Morocco
<input checked="" type="checkbox"/> BA	Bosnia and Herzegovina	<input checked="" type="checkbox"/> MD	Republic of Moldova
<input checked="" type="checkbox"/> BB	Barbados	<input checked="" type="checkbox"/> MG	Madagascar
<input checked="" type="checkbox"/> BG	Bulgaria	<input checked="" type="checkbox"/> MK	The former Yugoslav Republic of Macedonia
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<input checked="" type="checkbox"/> BY	Belarus	<input checked="" type="checkbox"/> MW	Malawi
<input checked="" type="checkbox"/> CA	Canada	<input checked="" type="checkbox"/> MX	Mexico
<input checked="" type="checkbox"/> CH and LI	Switzerland and Liechtenstein	<input checked="" type="checkbox"/> NO	Norway
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<input checked="" type="checkbox"/> HU	Hungary	<input checked="" type="checkbox"/> UA	Ukraine
<input checked="" type="checkbox"/> ID	Indonesia	<input checked="" type="checkbox"/> UG	Uganda
<input checked="" type="checkbox"/> IL	Israel	<input checked="" type="checkbox"/> US	United States of America
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<input checked="" type="checkbox"/> IS	Iceland	<input checked="" type="checkbox"/> VN	Viet Nam
<input checked="" type="checkbox"/> JP	Japan	<input checked="" type="checkbox"/> YU	Yugoslavia
<input checked="" type="checkbox"/> KE	Kenya	<input checked="" type="checkbox"/> ZA	South Africa
<input checked="" type="checkbox"/> KG	Kyrgyzstan	<input checked="" type="checkbox"/> ZW	Zimbabwe
<input checked="" type="checkbox"/> KP	Democratic People's Republic of Korea	Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:	
<input checked="" type="checkbox"/> KR	Republic of Korea	<input checked="" type="checkbox"/> AG, ANTIQUA AND BARBUDA	
<input checked="" type="checkbox"/> KZ	Kazakhstan	<input checked="" type="checkbox"/> DZ, ALGERIA	
<input checked="" type="checkbox"/> LC	Saint Lucia		
<input checked="" type="checkbox"/> LK	Sri Lanka		
<p><b>Precautionary Designation Statement:</b> In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)</p>			

## Supplemental Box

If the Supplemental Box is not used, this sheet should not be included in the request.

1. If, in any of the Boxes, the space is insufficient to furnish all the information: in such case, write "Continuation of Box No. ..." [indicate the number of the Box] and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:
  - (i) if more than two persons are involved as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country), of residence if no State of residence is indicated below;
  - (ii) if, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;
  - (iii) if, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;
  - (iv) if, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;
  - (v) if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. V, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part": in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;
  - (vi) if, in Box No. VI, there are more than three earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI;
  - (vii) if, in Box No. VI, the earlier application is an ARIPO application: in such case, write "Continuation of Box No. VI", specify the number of the item corresponding to that earlier application and indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed.
2. If, with regard to the precautionary designation statement contained in Box No. I, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.
3. If the applicant claims, in respect of any designated Office, the benefits of provisions of the national law concerning non-prejudicial disclosures or exceptions to lack of novelty: in such case, write "Statement concerning non-prejudicial disclosures or exceptions to lack of novelty" and furnish that statement below.

## CONTINUATION OF BOX No. IV

GOODWIN, MARK  
QUEST, BARRY  
HILL, RICHARD  
MIDDLEMIST, IAN ALASTAIR  
PHILLIPS, PATRICIA MARIE

OF WILSON GUNN M'CAW  
47-51, ROYAL EXCHANGE,  
CROSS STREET,  
MANCHESTER,  
M2 7BD  
UNITED KINGDOM

Box No. VI PRIORITY C 1		<input type="checkbox"/> Further priority			Claims are indicated in the Supplemental Box.	
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:				
		national application: country	regional application: regional Office	international application: receiving Office		
item (1) G.B.	(26 04 1999) 26 April 1999	9909512.7				
item (2) G.B.	14 July 1999 (14 07 1999)*	9916441.0				
item (3)						

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):

[9909512.7]  
[9916441.0]

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

### Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year)

Number

Country (or regional Office)

ISA /

### Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets:

request : 4  
description (excluding sequence listing part) : 11  
claims : 4  
abstract : 1  
drawings : 7  
sequence listing part of description :  
Total number of sheets : 27

This international application is accompanied by the item(s) marked below:

1. ☐ fee calculation sheet
2. ☐ separate signed power of attorney
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☐ other (specify): PCT/RO/101 Form 23/77

Figure of the drawings which should accompany the abstract:

2

Language of filing of the international application:

English

### Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

QUEST BARRY  
(AUTHORISED REPRESENTATIVE)

For receiving Office use only		2. Drawings:	
1. Date of actual receipt of the purported international application:	26 APR 2000 (26. 04. 2000)	<input checked="" type="checkbox"/> received:	
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		<input type="checkbox"/> not received:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):			
5. International Searching Authority (if two or more are competent): ISA /	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.		

For International Bureau use only	
Date of receipt of the record copy by the International Bureau:	

## PATENT COOPERATION TREATY

From the RECEIVING OFFICE

PCT

To:

Quest, Barry  
 Wilson Gunn M'Caw  
 41-51 Royal Exchange  
 Cross Street  
 Manchester M2 7BD  
 GRANDE BRETAGNE


 NOTIFICATION OF THE INTERNATIONAL  
 APPLICATION NUMBER AND OF THE  
 INTERNATIONAL FILING DATE

(PCT Rule 20.5(c))

Date of mailing (day/month/year)		16 06 2000
Applicant's or agent's file reference P/14/33.WO		IMPORTANT NOTIFICATION
International application No. PCT/EP 00/04385	International filing date (day/month/year) 26/04/2000	Priority date (day/month/year) 26/04/1999
Applicant HAYWARD, Phillip Fields		
Title of the invention		

- The applicant is hereby notified that the international application has been accorded the international application number and the international filing date indicated above.
- The applicant is further notified that the record copy of the international application was transmitted to the International Bureau on the above date of mailing.
- ☐ Other:

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International publication date (day/month/year) Not yet published	Priority date (day/month/year) 26 April 1999 (26.04.99) <b>RECEIVED</b>
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<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
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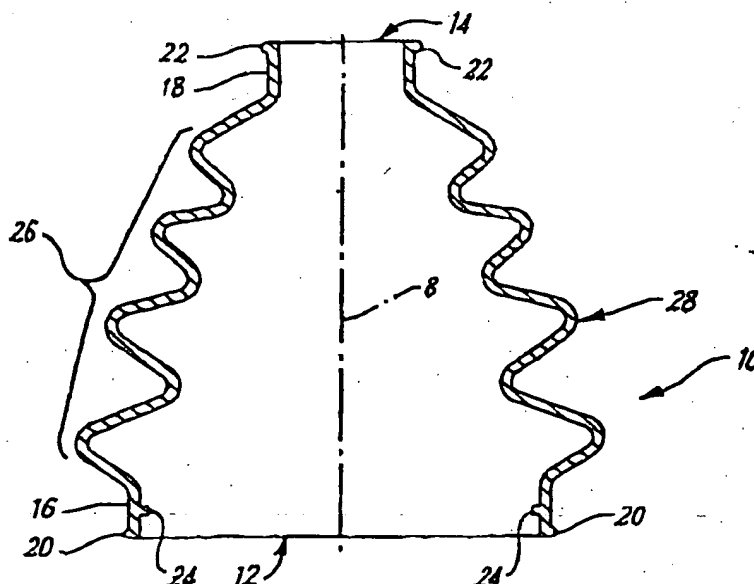
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(54) Title: A METHOD FOR INSTALLING A PROTECTIVE GAITER AROUND A JOINT



## (57) Abstract

A method of installing a gaiter (10) around a joint defined between joint members of joints of vehicles, such as steering joints and constant velocity joints. The method provides a range of gaiters for use with a range of joints of different dimensions, the range of joints being greater than the range of gaiters and at least some of the gaiters (10) in the said gaiter range being stretchable to fit two or more joints of the said joint range so the said joint range can be accommodated by the range of gaiters wherein a gaiter is selected from the gaiter range to fit a particular joint.

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A METHOD FOR INSTALLING A PROTECTIVE GAITER AROUND A JOINT

This invention relates to a method for installing a protective gaiter around a joint.

Flexible rubber gaiters are used in motor cars to protect constant  
5 velocity joints and joints defined between steering racks and track rods or  
their housings, so as to prevent the ingress of dirt and moisture and the  
egress of lubricants.

These gaiters customarily comprise one-piece moulded tubes having  
cylindrical end portions suitably diametered to fit the pertaining joint  
10 members and a convoluted central portion which can flex to allow bending  
and change of length.

To allow for the fact that such joints of different motor car models  
usually have different dimensions, it has been found necessary to provide  
a corresponding range of differently dimensioned gaiters. However, due to  
15 the manufacturing costs of producing a comprehensive range of gaiters and  
the inconvenience of maintaining stocks of the different gaiters, gaiters have  
been developed having end portions adapted by the provision of multiple  
fitting sections allowing attachment to a number of different diameters of  
joint members.

20 Whilst generally satisfactory, because the end portions can represent  
significant parts of the length of the gaiter, limitations in the flexibility of  
such portions can impose limitations on the overall flexibility of the gaiter.



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Gaiters with shortened fitting sections have been developed which improve the overall flexibility of the gaiter. However these shortened fitting sections are difficult to attach securely to joint members, with the result that such gaiters can become dislodged more easily.

5           An object of the present invention is to eliminate or at least minimise the above outlined problems.

          According to the invention therefore there is provided a method of installing a gaiter around a joint defined between joint members the method comprising providing a range of gaiters for use with a range of joints of  
10          different dimensions, the range of joints being greater than the range of gaiters and at least some of the gaiters in the said gaiter range being stretchable to fit two or more joints of the said joint range so the said joint range can be accommodated by the range of gaiters wherein a gaiter is selected from the gaiter range to fit a particular joint.

15          With this arrangement a reduced range of gaiters can be used (and manufactured and stocked) to accommodate a large range of differently dimensioned joints, whilst at the same time the overall flexibility of each gaiter in the range is maintained.

          The joint range may include any number of joints and may comprise  
20          one or more types of joint. Thus, the joint range may comprise only steering joints or only constant velocity joints. Alternatively, however the joint range may comprise a combination of steering and constant velocity

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joints.

Each joint may take any form, preferably being defined between first and second members, which in the case of a steering joint, may be a steering rack and track rod (respectively).

5            Preferably, each gaiter of the said range of gaiters comprises a flexible tubular body having first and second ends and a central portion therebetween the said ends being configured for secure attachment to respective first and second joint members.

10           The gaiter body may take any suitable shape, and may be conically tapered (such that the body is generally cone shaped or has one or more conically tapered portions e.g. end portions) or it may be generally cylindrical. The gaiter may incorporate a central portion having folds therein to permit axial extension of the body.

15           Each end portion of at least one gaiter of the said gaiter range may incorporate a respective single annular fitting section or channel. Thus the flexibility of the gaiter is optimised.

            However, the gaiter range may include at least one gaiter having a plurality of seating channels at one or each end portion.

20           At least one gaiter of the gaiter range may be dimensioned to fit exactly, without any substantial stretching of the gaiter, one or more of the range of joints whilst also being stretchable to fit other joints in the joint range. To this end, preferably, the wall of said at least one gaiter is

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configured and dimensioned to provide the requisite stretch characteristics for a given range of joint member dimensions.

Accordingly, the wall of said at least one gaiter preferably has, throughout, a maximum thickness of approximately 3mm.

5            Preferably, the said at least one gaiter has stretch characteristics to accommodate the process of fitting the gaiter. In some cases the joints are configured such that the free ends of joint members are enlarged relative to the portion of the joint member at which the gaiter is fixed and so the gaiter must be stretchable over such enlarged joint ends and a fitting cone or any  
10           other fitting device, and then able to contract to fit about the joint member shaft. The wall thickness of the end portions of gaiters for installing on such joints is particularly critical.

Accordingly, the wall thickness of one or more gaiters in the gaiter range may be approximately 2mm.

15           Alternatively or additionally, the said at least one gaiter maybe formed from a synthetic rubber compound formulated to provide a minimum stretch of 550% "at break" (i.e. under a standard destructive rubber testing procedure in which the rubber is stretched until breaking point).

20           With this arrangement, a gaiter can be stretched manually (by e.g. a mechanic) without undue force temporarily, i.e., during fitting, so as to accommodate enlarged end portions of joint members or to stretch over a fitting device such as a standard fitting cone without dismantling the joint.

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Preferably, the said at least one gaiter has stretch characteristics to accommodate prolonged installation in position about a joint.

Accordingly, one or both end portions of the said at least one gaiter are permanently stretchable to a diameter which is 115% of the respective  
5 (unstretched) end portion diameter, wherein the stretching of the gaiter results in no more than a 10% change in the properties of the gaiter rubber (the salient properties being tensile strength, elongation "at break", hardness and compression set).

With this arrangement, the gaiter can be fitted in a stretched state for  
10 prolonged periods without any consequential acceleration of chemical/mechanical aging/deterioration of the material.

At least some of the gaiters in the said gaiter range may be formed from a synthetic rubber compound which is formulated so that the gaiter is also compressible to fit two or more joints of the joint range.

15 Further preferably, one or both end portions of the said at least one gaiter (of the gaiter range) are radially compressible. The gaiter then may be compressed (by means of an appropriate fastening strap, clip, etc.) to fit on the joint member.

Preferably, the said one or both end portions are radially  
20 compressible to a compressed diameter which is 98% of the (uncompressed) respective end portion diameter, and particularly preferably, the compressed end portion and in particular, the pertaining fitting section

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retains a substantially circular cross-section. With this arrangement the compression does not result in substantial flexing, creasing or distortion of the fitting section which could otherwise lead to leakage of lubricant, etc., therefrom.

5           Most preferably, the gaiter is stretchable in all directions, and is at least stretchable longitudinally and transversely (relative to the longitudinal axis of the gaiter).

The gaiter may however be formed from any other suitable stretchable material, such as natural rubber.

10           The gaiter may be moulded in one piece.

The said end portions of one or more gaiters of the gaiter range may incorporate one or more internal and/or external ribs or beads which may extend wholly or partially around the circumference of a respective end portion of the said one or more gaiters.

15           With this arrangement the strength of the end portions of the gaiter may be enhanced whilst not unduly interfering with the desired stretchability of these portions.

The wall thickness of the gaiters in the gaiter range may be constant, alternatively, one or more gaiters may incorporate a gaiter wall which varies in thickness to alter the flexing characteristics of the respective gaiter(s).

20           It will be immediately evident from the above description that the gaiter range may comprise any suitable combination of gaiters in order that

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the gaiter range can be used to accommodate the particular joint range.

According to a second aspect of the invention, there is provided a gaiter for use in the above mentioned method wherein the gaiter is stretchable to fit two or more joints in a joint range.

5           The preferred features of the above gaiter are described above in relation to the gaiter range for use in the method of the first aspect of the invention.

Once positioned on the joint members, the said first and second ends of the gaiter may be secured to the respective first and second joint  
10       members in any suitable manner, for instance using ties, straps or clips.

The invention will now be described further by way of example only and with reference to the accompanying drawings in which:

Figures 1 - 8       are sectional side views of gaiters of one form of gaiter range according to the invention, the gaiter range being  
15       for use with a range of constant velocity joints; and

Figures 9 - 11     are sectional side views of gaiters of another form of gaiter range according to the invention, the gaiter range being for use with a range of steering joints.

The gaiter 10 of Figure 1 comprises a one-piece moulded rubber  
20       tubular body of generally frusto-conical form having two end portions; a wider end portion 12 and a narrow end portion 14.

These end portions 12 and 14 incorporate respective annular fitting

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sections 16 and 18 which are flat when viewed in cross section. These sections are suitably configured and adapted such that a relatively large amount of flexibility is permitted therein both transversely of and parallel to the tube axis 8. On its outer surface each annular fitting section 16 and 18 is bounded at each free end by respective circumferential ribs 20 and 22. On its inner surface, the wider end annular fitting section 12 has a radially projecting circumferential rib 24.

The central portion 26 of the gaiter is formed into multiple convolutions or folds 28 which allow this section to flex and also to extend axially.

With the gaiter 10 formed as above it will be appreciated that such gaiter is readily flexible along the entire length of the tubular body and not solely in the region of the central portion 26 thereof.

The gaiter has a constant wall thickness of 2mm except where the radius of a fold is 4.5 mm and above where the wall thickness increases marginally. Notwithstanding this variation, the wall thickness of the gaiter does not exceed 3mm at any point.

Importantly, the wall thickness and rubber stretch characteristics allows for the gaiter to fit a number of joints either exactly or by stretching of the gaiter by means of its stretchability (primarily at the end portions which will, for many joints have to stretch over fitting devices such as fitting cone and enlarged joint member ends and then contract to fit in the

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desired position on the joint member shaft.

The gaiter is formed from a synthetic, e.g. neoprene rubber compound formulated to provide a minimum stretch of 550% "at break", (that is, under a standard destructive rubber testing procedure which is well known to those skilled in the relevant field of technology). With this arrangement, a gaiter can be stretched manually (by e.g. a mechanic) without undue force temporarily, i.e., during fitting, so as to accommodate enlarged end portions of joint members or to stretch over a fitting device such as a standard fitting cone without dismantling the joint (other than to disconnect the joint members from each other).

In addition the gaiter has stretch characteristics to accommodate prolonged installation in position about a joint.

Accordingly the end portions of each gaiter in the range shown can stretch to give 115% increase in the respective end portion diameter, wherein the stretching of the gaiter results in no more than a 10% change in the properties of the gaiter rubber (the salient properties being tensile strength, elongation "at break", hardness and compression set).

With this arrangement, the gaiter can be fitted in a stretched state for prolonged periods without any consequential acceleration of chemical/mechanical aging/deterioration of the material.

In addition, the synthetic, e.g. neoprene rubber compound is formulated to also allow compression of the gaiter walls so that the end



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portions of each gaiter are radially compressible to 98% of the respective (uncompressed) end portion diameter wherein the compressed end portion retains a substantially circular cross section. With this arrangement the compression does not result in substantial flexing, creasing or distortion of the fitting section which could otherwise lead to leakage of lubricant, etc., therefrom. Thus, these gaiters can also be compressed (by fixing ties or clips) to fit about joint members which are slightly smaller in diameter than the respective gaiter end portions.

The gaiter is secured in position by clamping the end sections to respective joint members of a constant velocity joint (not shown) using ties or circlips or other conventional securing means which are maintained in position on respective annular seating channels by the ribs 20,22.

Figures 2 - 8 show the remaining gaiters of the gaiter range (and like reference numerals are used for like parts).

The gaiter range is by the combination of compressibility and stretchability able to accommodate a range of joints comprising the constant velocity joints of all European (including UK), and Japanese motor car models in the current UK 'car parc' (a term which will be understood by the skilled man in this field as referring to all commercially, freely available models). The gaiter range can of course be updated to accommodate the changing car parc.

The gaiter range shown has enormous advantages. By means of the

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particular combination of dimensional characteristics and compressibility/  
stretchability of the gaiters in the range, this small range can be used to  
accommodate the great range of joint members of motor vehicle models as  
defined above, thereby reducing the associated manufacturing and storage  
5 costs involved whilst, at the same time, the overall flexibility of each gaiter  
in the range is optimised.

Figures 9 - 11 show the gaiters of a gaiter range which is used to  
accommodate a range of steering joints (not shown) which corresponds  
with the above defined range of constant velocity joints. The features are  
10 as described for the above range of gaiters (again, like reference numerals  
are used for like parts).

The gaiters of the second range each have additional seating areas  
32 and associated ribs thereon, thereby reducing the range to comprise only  
three gaiters. The length of these gaiters may be adjusted by cutting the  
15 end portion along the outer edge of the additional seating area 32. One or  
more of the gaiters of the second range could, alternatively, comprise single  
annular seating channels at one or both end portions without greatly  
increasing the range of gaiters necessary to accommodate the range of  
steering gaiters defined above.

20 It is of course to be understood that the invention is not to be  
intended to be restricted to the details of the above embodiment which are  
described by way of example only.

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CLAIMS

1. A method of installing a gaiter (10) around a joint defined between joint members the method comprising providing a range of gaiters (10) for use with a range of joints of different dimensions, the range of joints being  
5 greater than the range of gaiters and at least some of the gaiters (10) in the said gaiter range being stretchable to fit two or more joints of the said joint range so the said joint range can be accommodated by the range of gaiters wherein a gaiter (10) is selected from the gaiter range to fit a particular joint.
- 10 2. A method according to claim 1, wherein each joint is defined between first and second members and each gaiter (10) of the said range of gaiters comprises a flexible tubular body having first and second end portions (12,14) and a central portion (26) therebetween the said end portions (12,14) being configured for secure attachment to respective first and  
15 second joint members.
3. A method according to any preceding claim in which each gaiter (10) incorporates a central portion (26) having folds (28) therein to permit axial extension of the gaiter body (10).
4. A method according to any preceding claim in which each end portion  
20 (12,14) of at least one gaiter (10) of the said gaiter range incorporates a respective single annular fitting section or channel (16,18).
5. A method according to any preceding claim in which the gaiter range

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includes at least one gaiter (10) having a plurality of seating channels (32) at one or each end portion (12,14).

6. A method according to any preceding claim in which at least one gaiter (10) of the gaiter range is dimensioned to fit exactly, without any substantial stretching of the gaiter (10), one or more of the range of joints whilst also being stretchable to fit other joints in the joint range.

7. A method according to any preceding claim in which the wall of said at least one gaiter (10) is configured and dimensioned to provide the requisite stretch characteristics for a given range of joint member dimensions.

8. A method according to any preceding claim in which the wall of said at least one gaiter (10) has, throughout, a maximum thickness of approximately 3mm.

9. A method according to any preceding claim in which the said at least one gaiter (10) has stretch characteristics to accommodate the process of fitting the gaiter (10).

10. A method according to any preceding claim in which the wall thickness of one or more gaiters (10) in the gaiter range is approximately 2mm.

11. A method according to any preceding claim in which the said at least one gaiter (10) may be formed from a synthetic rubber compound formulated to provide a minimum stretch of 550% at break.

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12. A method according to any preceding claim in which the said at least one gaiter (10) has stretch characteristics to accommodate prolonged installation in position about a joint.

5 13. A method according to any preceding claim in which one or both end portions (12,14) of the said at least one gaiter (10) are permanently stretchable to a diameter which is 115% of the respective (unstretched) end portion diameter, wherein the stretching of the gaiter (10) results in no more than a 10% change in the properties of the gaiter rubber.

10 14. A method according to any preceding claim in which at least some of the gaiters (10) in the said gaiter range are formed from a synthetic rubber compound which is formulated so that the gaiter is also compressible to fit two or more joints of the joint range.

15 15. A method according to any preceding claim in which one or both end portions (12,14) of the said at least one gaiter (10) (of the gaiter range) are radially compressible.

16. A method according to any preceding claim in which the said one or both end portions (12,14) are radially compressible to a compressed diameter which is 98% of the (uncompressed) respective end portion diameter.

20 17. A method according to any preceding claim in which the said one or both end portions (12,14) are radially compressible, such that the compressed end portion and, in particular, the pertaining fitting section

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retains a substantially circular cross-section.

18. A method according to any preceding claim in which the or each gaiter (10) of the range is stretchable in all directions, and is at least stretchable longitudinally and transversely (relative to the longitudinal axis of the gaiter).

19. A method according to any preceding claim in which the said end portions (12,14) of one or more gaiters (10) of the gaiter range incorporate one or more internal and/or external ribs or beads (20,22) which extend wholly or partially around the circumference of a respective end portion (12,14) of the said one or more gaiters.

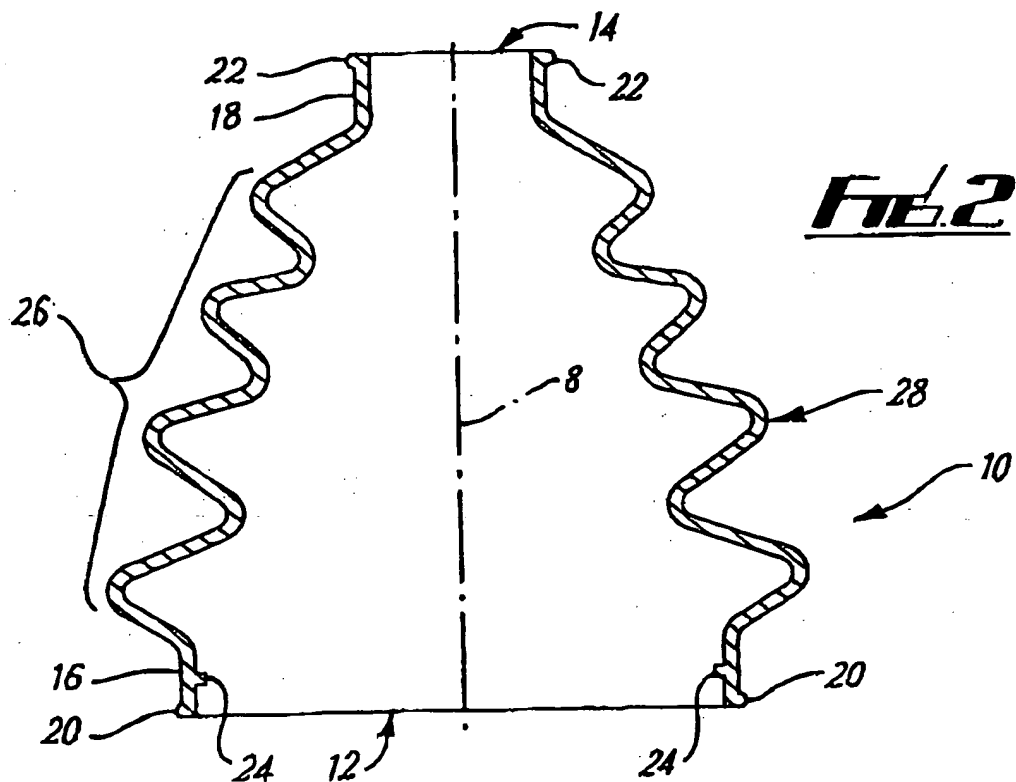
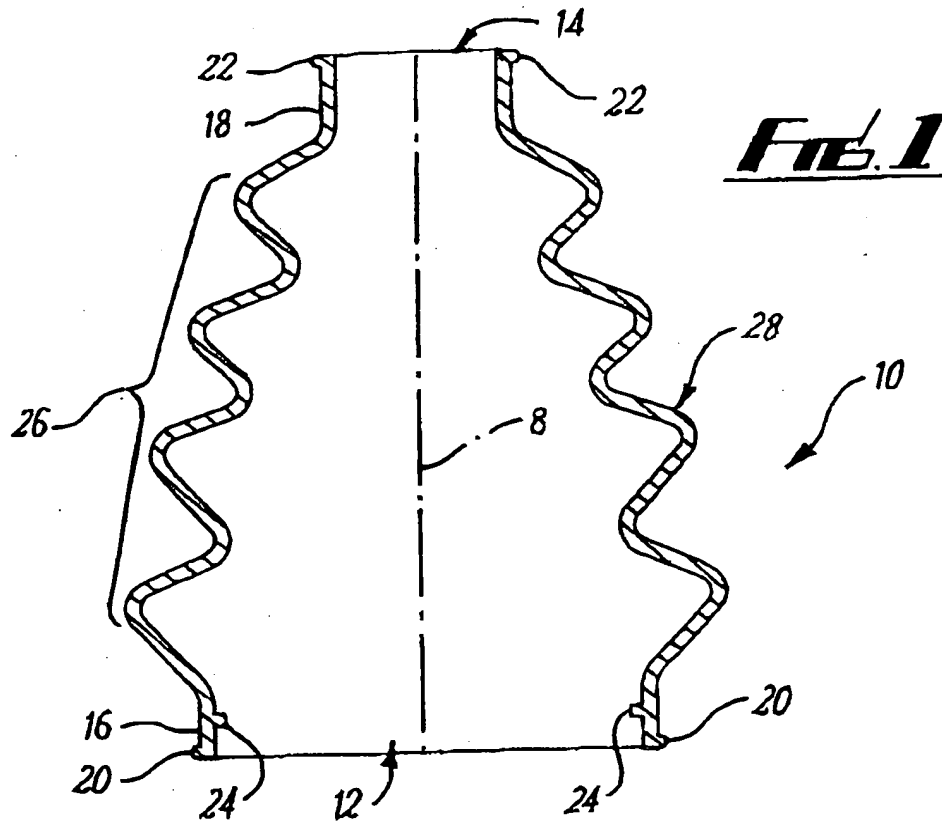
20. A method according to any preceding claim in which the wall thickness of the gaiters (10) in the gaiter range is constant.

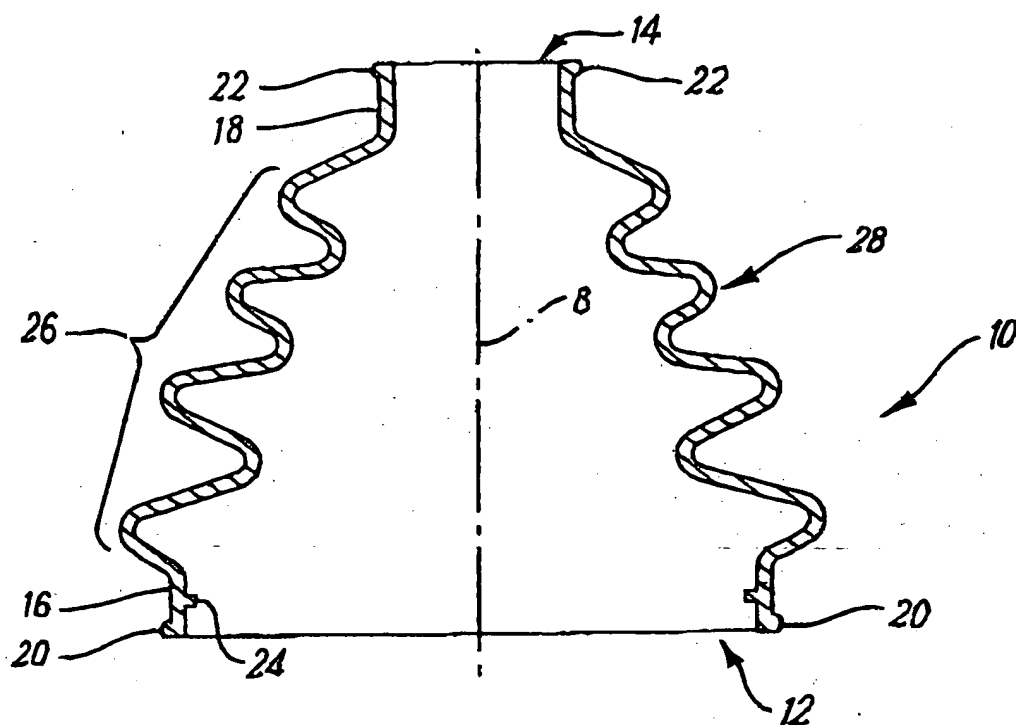
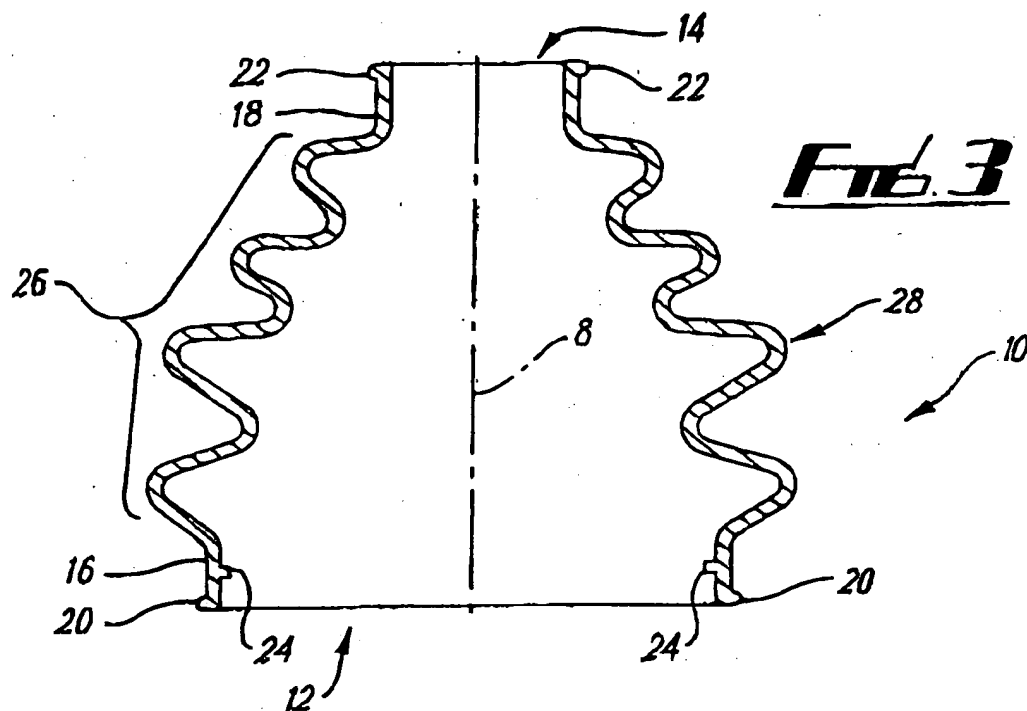
21. A method according to any preceding claim in which one or more gaiters (10) of the range incorporate a gaiter wall which varies in thickness to alter the flexing characteristics of the respective gaiter(s).

22. A method of installing a gaiter (10) substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

23. A gaiter (10) suitable for use in the method of any preceding claim, wherein the gaiter is stretchable to fit two or more joints of a joint range.

24. A gaiter (10) substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

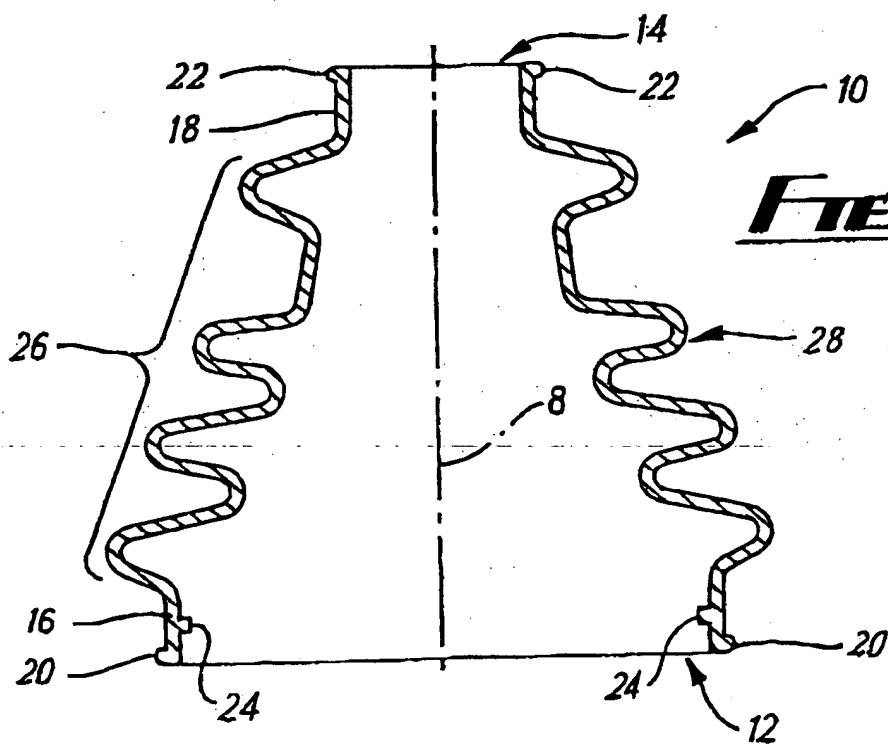
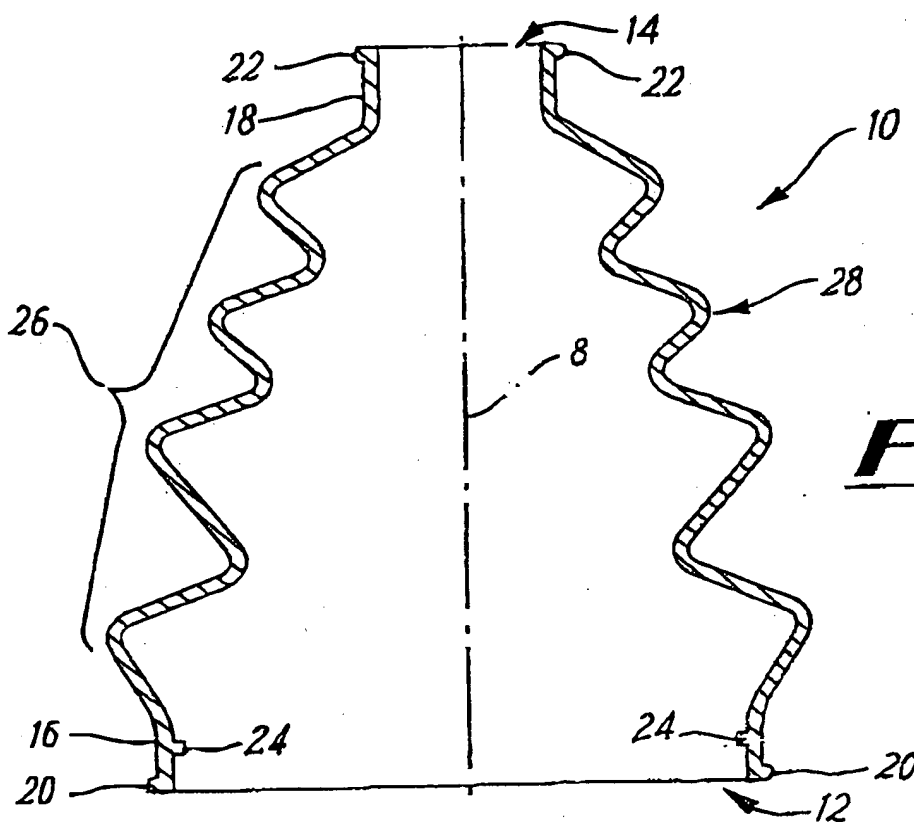




**FIG. 4**



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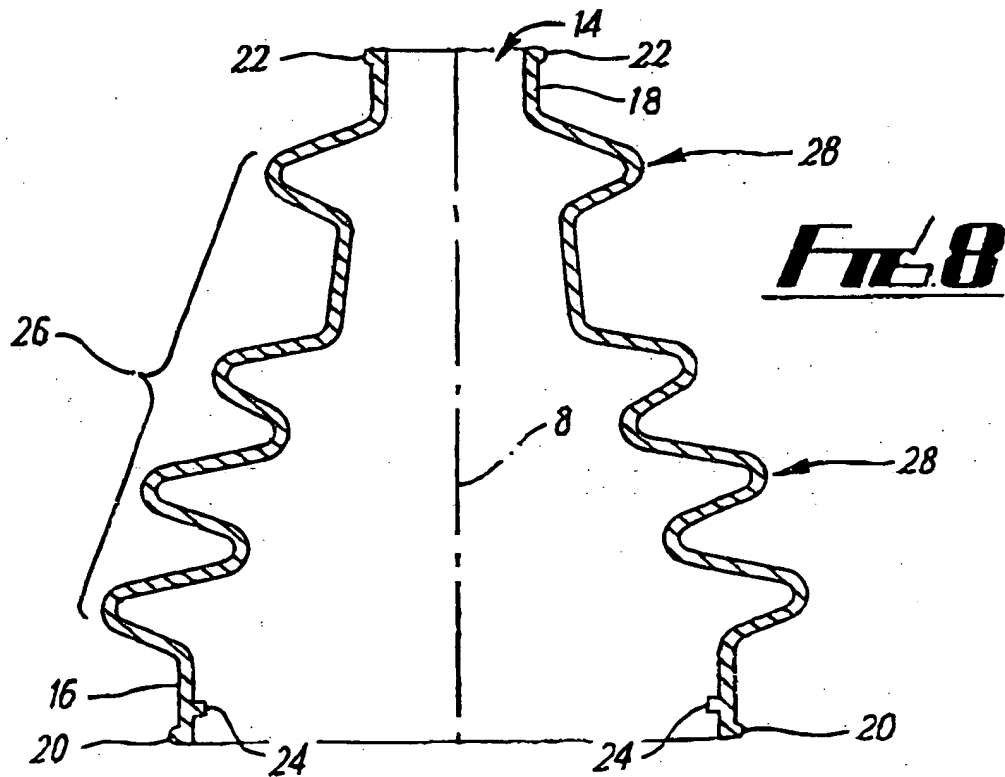
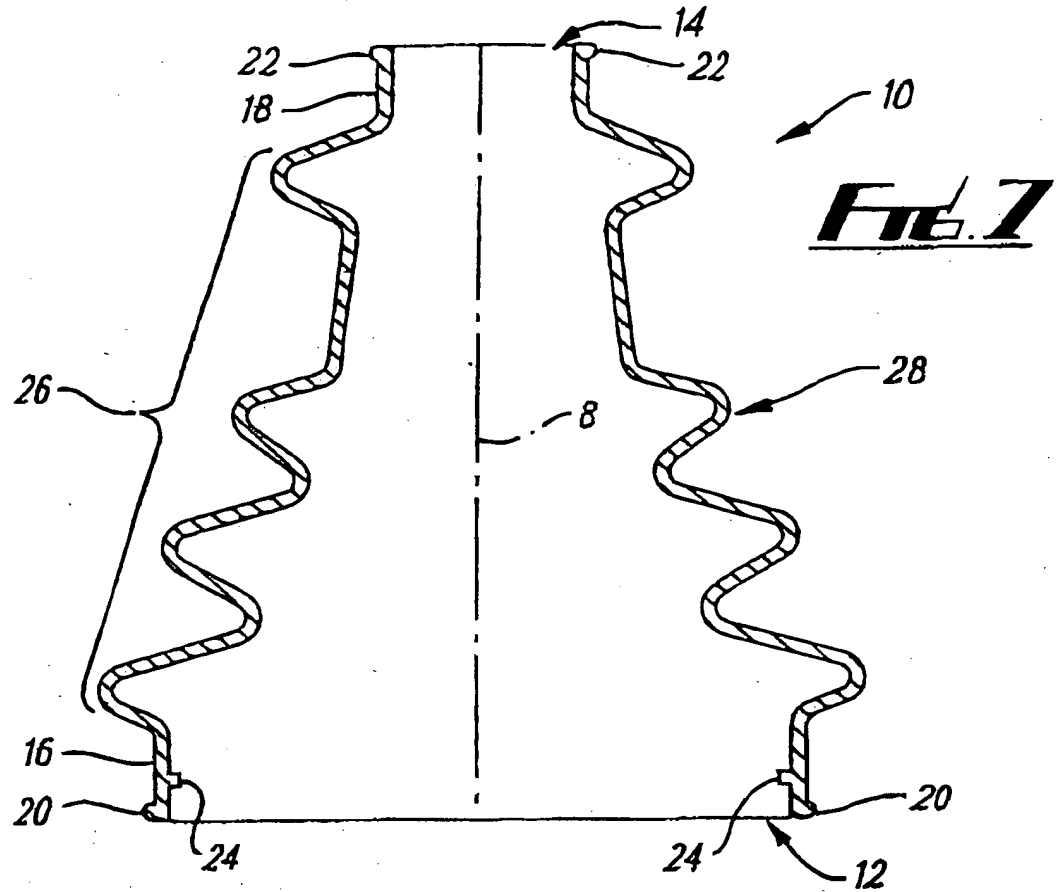


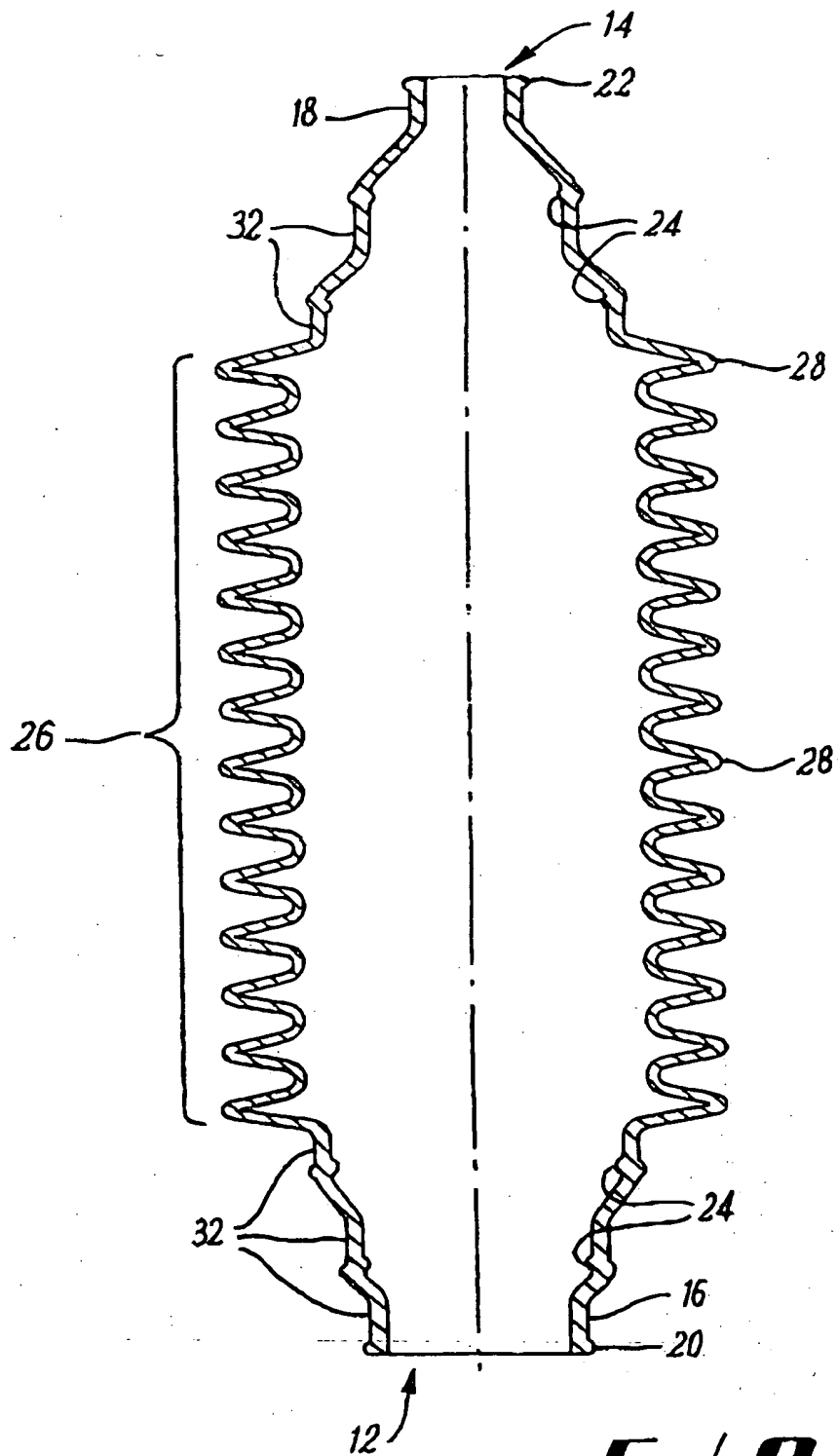
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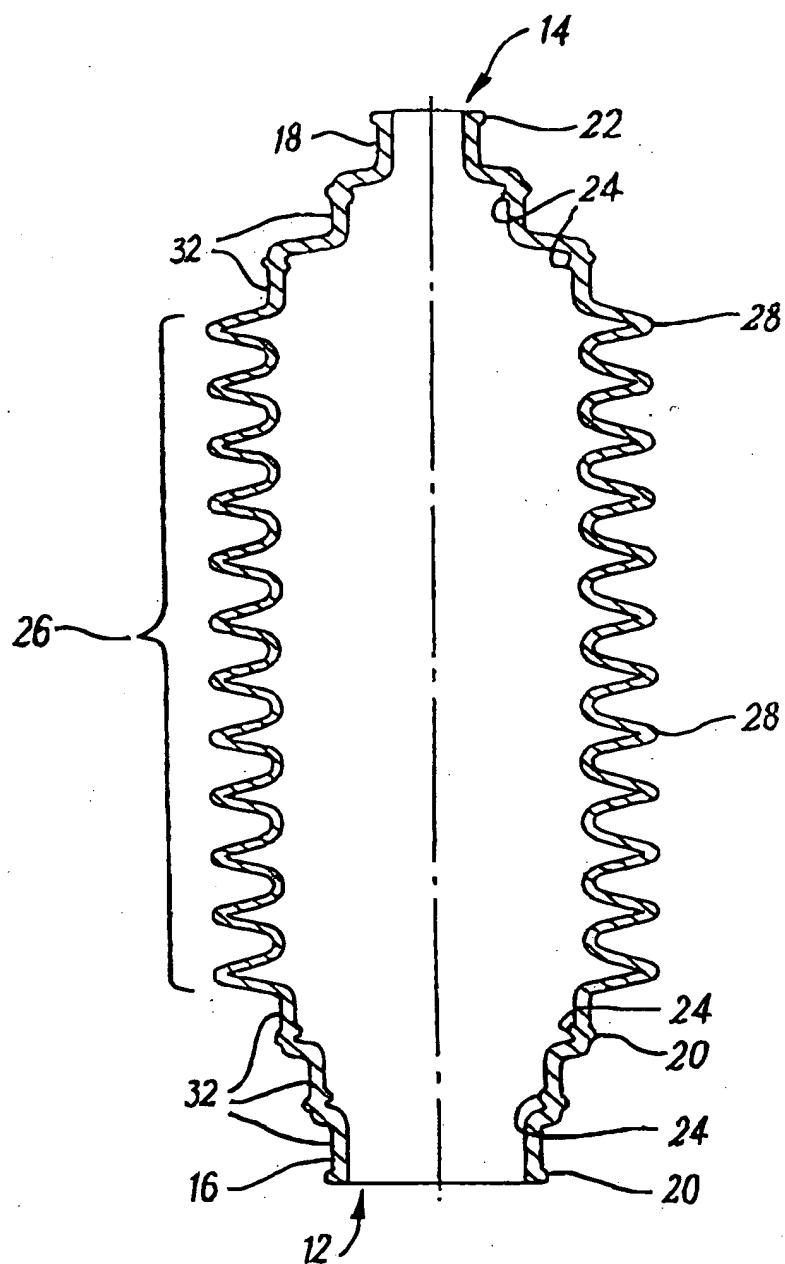
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**FIG. 9**

**FIG. 10**

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